

INDIVIDUAL DIFFERENCES IN COGNITIVE STYLES OF MUSIC LISTENING: PREFERENCES AND MUSICAL IDENTITY

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ABSTRACT

This study was designed to further elaborate previous observations concerning the novel constructs of music empathizing (ME) and music systemizing (MS) representing cognitive styles in music listening (Kreutz, Schubert and Mitchell, 2007). The basic assumption is that Baron-Cohen, Knickmeyer and Belmonte's (2005) empathizer-systemizer theory (E-S theory) can be applied to and specified for the music domain. Here we test three hypotheses that predict individual differences to modulate music cognitive styles. Results partially confirm that music cognitive styles are systematically influenced by a) the nature and breadth of music preferences and b) the identity of the performer as soloist or orchestra/band player. Interactions between some of the musical background variables and gender were noted. Taken together, these results confirm specific influences of individual differences on cognitive styles in the music domain and thus offer further validation of the music empathizing and music systemizing constructs.

1. INTRODUCTION

The empathizer-systemizer theory (E-S theory) by Baron-Cohen, Knickmeyer and Belmonte (2005) has been developed to challenge, if not replace essentialist notions of gender by means of a brain type approach. Within this approach, tendencies of behaviours ascribed to the empathizing and systemizing brain types are used to explain psychological gender differences. In brief, the female brain type is characterized by its affinity to the analysis of interpersonal relations and emotional states within these relations, whereas the male brain type is characterized by its affinity to the analysis of objects and events. These characteristics correlate to an extent with well-established gender differences in personality traits (Nettle, 2007).

In a previous study, Kreutz, Schubert and Mitchell (2007) developed music cognitive style scales on the basis of a questionnaire survey (N = 442). Responses to a 54-item inventory were submitted to factor analysis procedures. First, the alignment of music cognitive empathizing and systemizing (ME and MS respectively) factors was established. This was achieved by selecting corresponding items from the general cognitive style inventory (Wakabayashi et al., 2006) within a two-factor solution (using varimax rotation). Items loading higher than |0.4| were chosen and validated to represent ME

and MS in the construction of respective scales for the two dimensions of music cognitive styles. A specially developed, simplified unit weighting (SUW) scoring regime was then applied to identify individual differences in ME and MS within the population surveyed. Systematic associations were observed between music cognitive styles, gender, and music performance experience. In particular, females were found to be *positive* music empathizers and *negative* music systemizers, while males showed the opposite pattern. Moreover, music systemizing was modulated by the level of music performance experience such that professional musicians were scoring higher than did amateurs or nonmusicians.

The present study sought to further assess music cognitive styles in relation to individual differences in terms of music preferences and to musical identity variables. In particular, the following research questions were addressed:

1. To what extent are the specific preferences for and breadth of interests in different musical styles and genres systematically associated with music empathizing and music systemizing?
2. To what extent are the musical identities of individual performers as soloists or ensemble/orchestra players systematically associated with music empathizing and music systemizing?

2. METHOD

2.1 Participants

Participants were sought from university and college students populations as well as from their relatives and friends. There were 442 respondents, 296 female and 143 male, aged between 12 and 87 (mean age 32.6, SD 13.1 years).

2.2 Materials

An on-line survey was constructed using the environment provided by SurveyMonkey©. Participants filled in a music cognitive style inventory and provided demographic as well as music preferences and musical background information. Music empathizing and systemizing scales developed by Kreutz, Schubert and Mitchell (2007) were used as dependent variables to assess the influences of style and genre preferences, performance experience and background on these measures.

2.3 Design and Procedure

Respondents were invited via e-mail to take part in the survey. The opportunity to participate in a prize draw was offered. The welcome page of the on-line survey informed the participants about the nature, purpose and scope of the study. Participants were assured of confidentiality and anonymity. The survey included a two-part music cognitive style inventory as well as questionnaires addressing demographic and musical background information.

3. RESULTS

Table 1 shows the means and standard deviations of the two cognitive style scores, which functioned as the dependent variable in a series of repeated measures analysis of variance (ANOVA) procedures, in which preference for different genres were entered as independent variables.

Table 1: Means (and SD) of music empathizing (ME) and music systemizing (MS) scores for groups of individuals with different music preferences.

Genre	Preference	N	Cognitive Style	
			ME	MS
Classic	Yes	156	-0.71 (10.92)	2.41 (9.34)
	No	286	-0.36 (11.97)	-5.03 (10.24)
Jazz	Yes	225	0.07 (10.27)	2.83 (8.99)
	No	217	-1.23 (12.18)	-3.15 (10.62)
Pop	Yes	210	.11 (11.03)	-2.90 (9.88)
	No	227	-1.29 (11.51)	2.71 (11.28)

Note: Values in brackets represent standard deviations.

A significant within-subjects interaction was found between classical music preference and cognitive styles, $F(1, 440) = 35.13, p < 0.0001$, partial eta squared = 0.07. Classical music preference also produced a significant main effect, $F(1, 440) = 18.91, p < 0.0001, \eta^2 = 0.04$. Subsequent univariate ANOVAs, which were performed on the two cognitive styles individually revealed a significant effect of preference for classical music only for music systemizing, $F(1, 440) = 59.74, p < 0.0001, \eta^2 = 0.12$. Individuals, who choose to listen to classical music score higher in this measure. A similar pattern of results was found for preference for jazz: A significant within-subjects interaction was found, $F(1, 440) = 13.20, p < 0.0001, \eta^2 = 0.02$, as well as a significant main effect, $F(1, 440) = 22.10, p < 0.0001$, partial eta squared = 0.05. Again, the subsequent univariate ANOVA revealed a significant main effect for music systemizing only, $F(1, 440) = 40.72, p < 0.0001, \eta^2 = 0.09$.

Effects of preference for easy listening pop on cognitive styles were somewhat more complex as an interaction of gender was involved here that was not observed in the above analyses. The repeated measures analyses detected a significant effect of cognitive styles, $F(1, 433) = 10.96, p < 0.001, \eta^2 = 0.03$, as well as significant interactions between this variable and both preference for pop music,

$F(1, 433) = 6.32, p < 0.05, \eta^2 = 0.01$, and gender, $F(1, 433) = 50.36, p < 0.0001, \eta^2 = 0.10$. Females were similar in cognitive style values irrespective of preference for easy listening pop. Males, however, were *higher* in cognitive style values, if they did *not* prefer listening to pop music. However, this interaction disappeared, when gender was entered in the univariate ANOVAs of the two cognitive styles. A significant main effect emerged for music systemizing only, $F(1, 433) = 12.10, p < 0.001, \eta^2 = 0.03$. Individuals who did *not* prefer listening to pop music scored higher on music systemizing, $t(440) = 5.86, p < 0.0001$, irrespective of their gender.

Table 2 displays the mean cognitive style scores for groups of individuals varying in their breadth of musical interests.

Table 2: Means (and SD) of music empathizing (ME) and music systemizing (MS) scores for groups of individuals with different breadth of interests in musical styles and genres

Breadth of preferences	N	Cognitive Style	
		ME	MS
Narrow	142	-2.03 (12.36)	-3.77 (10.69)
Medium	120	-0.58 (10.91)	-0.57 (10.11)
Broad	180	0.54 (10.29)	2.83 (9.14)
Total	442	-0.59 (11.29)	-0.21 (10.29)

Note: There was a maximum of 21 genres and styles to choose from. Narrow music interests = 0 to 5 selections; medium music interests = 6 to 8 selections; broad music interests = 9 to 21 selections.

Repeated measures ANOVA detected no systematic influence of cognitive style, but a significant interaction of this variable with breadth of preferences, $F(2, 439) = 3.53, p < 0.05, \eta^2 = 0.02$. Post-hoc comparison of means using Tukey's HSD detected three homogenous subsets represented by each level of the breadth variable that were significantly different from each other at $p < 0.05$. Cognitive style values were lowest for 'narrow' ($M = -2.9$), intermediate for 'medium' ($M = -0.5$) and highest for 'broad' ($M = 1.7$). Subsequent univariate ANOVAs for the two cognitive styles showed a marginal effect on music empathizing, $F(2, 439) = 2.32, p = 0.10$. By contrast, breadth of musical preferences significantly influenced music systemizing, $F(2, 431) = 9.38, p < 0.001, \eta^2 = 0.04$. Again, post-hoc comparison of means using Tukey's HSD detected three homogenous subsets represented by each level of the breadth variable that were significantly different from each other at $p < 0.05$. Music systemizing values were lowest for 'narrow' ($M = -3.9$), intermediate for 'medium' ($M = -0.6$) and highest for 'broad' ($M = 2.8$) levels of the breadth of preferences variable.

Table 3: Correlation matrix of performer identity and music cognitive styles. Numbers represent Pearson's correlation coefficients.

Variable	MS	IS	VS	OM	BM
Music empathizing (ME)	0.09	0.06	0.08	0.16*	0.07
Music systemizing (MS)		0.17*	0.02	0.24**	0.23**
Instrumental soloist (IS)			0.00	0.23**	0.38**
Vocal soloist (VS)				0.00	0.08
Orchestra musician (OM)					0.19*

Note: BM = Band musician.

* $p < .05$

** $p < .001$

Table 3 presents the correlation matrix of different measures of musical identity as soloist (instrumental and vocal) as well as of orchestra and band musician. For the purpose of this analysis, only amateur, semi-professional and professional musicians were included. Those who reported having no musical performing experience were omitted from the analysis.

Concerning the associations between music cognitive styles and musical identity, few significant correlations exist between interests in solo or ensemble performance on the one hand, and ME and MS scores on the other. There were more significant correlations for MS, while only one coefficient was significant for ME. To explore these associations further, various groups were constructed on the basis of high or low interests in solo and ensemble (orchestra/band) performance. However, inferential analysis revealed no significant effects that were associated with music cognitive styles in these groups. Thus it appears that identifying as soloist or ensemble player does not strongly differentiate cognitive styles of music processing.

4. DISCUSSION

With respect to the first research question, preferences for jazz and classical music are associated with higher scores in music systemizing, whereas preference for easy listening pop are associated with higher levels of music empathizing and lower levels of music systemizing. Breadth of music preferences has an overall influence on music cognitive style, but was associated with relatively higher music systemizing. It was noted with respect to the second research question that the levels of music performance interests were found significantly, but only moderately correlated with music cognitive styles.

These results suggest that cognitive styles of music listening are affected by the general interest in music, while influences of individual music performance interests as soloists or ensemble players are marginal. Thus individual differences in musical preferences need to be considered in future research on cognitive styles of music processing, when selecting participants for listening experiments.

5. REFERENCES

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